4 PRACTICE AND APPLY

Assignment Guide

Answer Transparencies available for all exercises

Basic:
Day 1: EP p. 1015 Exs. 34–36
pp. 503–505
Exs. 1–15, 20–23, 58, 59, 72–79
Day 2: pp. 503–505
Exs. 28–40, 45–47, 60, 61, 64–71

Average:
Day 1: pp. 503–505
Exs. 1–7, 10–17, 22–25, 58, 59, 72–79
Day 2: pp. 503–505
Exs. 32–42, 48–52, 60–62, 64–71

Advanced:
Day 1: pp. 503–505
Exs. 1–6, 14–19, 24–27, 54–59*, 72–79
Day 2: pp. 503–505
Exs. 33–36, 41–44, 48–53, 60–71*

Block:
pp. 503–505
Exs. 1–7, 10–17, 22–25, 58, 59, 72–79 (with 7.3)
pp. 503–505
Exs. 32–42, 48–52, 60–62, 64–71 (with 7.5)

Differentiated Instruction

See *Algebra 2 Best Practices Toolkit* for suggestions on addressing the needs of a diverse classroom.

Homework Check

For a quick check of student understanding of key concepts, go over the following exercises:

Basic: 4, 10, 22, 38, 58

Average: 5, 14, 24, 40, 58

Advanced: 6, 18, 26, 42, 59

Extra Practice

- Student Edition, p. 1016
- Chapter 7 Resource Book: Practice levels A, B, C, pp. 42–44

Practice Worksheet

An easily-readable reduced practice page (with answers) for this lesson can be found on p. 476C.

EXAMPLE 3 on p. 500 for Exs. 20–27

CALCULATING LOGARITHMS Use a calculator to evaluate the logarithm.

20. $\log 14$ about 1.146 **21.** $\ln 6$ about 1.792 **22.** $\ln 0.43$ about −0.844 **23.** $\log 6.213$ about 0.793

24. $\log 27$ about 1.431 **25.** $\ln 5.38$ about 1.683 **26.** $\log 0.746$ about −0.127 **27.** $\ln 110$ about 4.700

EXAMPLE 5 on p. 501 for Exs. 28–36

USING INVERSE PROPERTIES Simplify the expression.

28. $7^{\log_7 x}$ x **29.** $\log_5 5^x$ x **30.** $30^{\log_{30} 4}$ 4 **31.** $10^{\log 8}$ 8

32. $\log_6 36^x$ $2x$ **33.** $\log_3 81^x$ $4x$ **34.** $\log_5 125^x$ $3x$ **35.** $\log_2 32^x$ $5x$

36. ★ **MULTIPLE CHOICE** Which expression is equivalent to $\log 100^x$? B

Ⓐ x Ⓑ $2x$ Ⓒ $10x$ Ⓓ $100x$

EXAMPLE 6 B on p. 501 for Exs. 37–44

FINDING INVERSES Find the inverse of the function.

37. $y = \log_8 x$ $y = 8^x$ **38.** $y = 7^x$ $y = \log_7 x$ **39.** $y = (0.4)^x$ $y = \log_{0.4} x$ **40.** $y = \log_{1/2} x$ $y = \left(\frac{1}{2}\right)^x$

41. $y = e^{x+2}$ $y = \ln x - 2$ **42.** $y = 2^x - 3$ $y = \log_2(x + 3)$ **43.** $y = \ln(x + 1)$ $y = e^x - 1$ **44.** $y = 6 + \log x$ $y = 10^{x-6}$

EXAMPLES 7 and 8 on pp. 502–503 for Exs. 45–53

GRAPHING FUNCTIONS Graph the function. State the domain and range. 45–53. See margin.

45. $y = \log_4 x$ **46.** $y = \log_6 x$ **47.** $y = \log_{1/3} x$

48. $y = \log_{1/5} x$ **49.** $y = \log_2(x - 3)$ **50.** $y = \log_3 x + 4$

51. $f(x) = \log_4(x + 2) - 1$ **52.** $g(x) = \log_6(x - 4) + 2$ **53.** $h(x) = \log_5(x + 1) - 3$

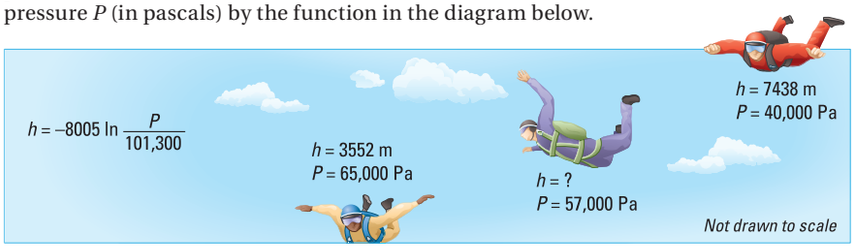
C **CHALLENGE** Evaluate the logarithm. (*Hint:* For each logarithm $\log_b x$, rewrite b and x as powers of the same number.)

54. $\log_{27} 9$ $\frac{2}{3}$ **55.** $\log_8 32$ $\frac{5}{3}$ **56.** $\log_{125} 625$ $\frac{4}{3}$ **57.** $\log_4 128$ $\frac{7}{2}$

PROBLEM SOLVING

EXAMPLE 4 A on p. 500 for Exs. 58–59

58. ALTIMETER Skydivers use an instrument called an altimeter to track their altitude as they fall. The altimeter determines altitude by measuring air pressure. The altitude h (in meters) above sea level is related to the air pressure P (in pascals) by the function in the diagram below.



What is the altitude above sea level when the air pressure is 57,000 pascals? about 4603 m

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59. CHEMISTRY The pH value for a substance measures how acidic or alkaline the substance is. It is given by the formula $\text{pH} = -\log [\text{H}^+]$ where H^+ is the hydrogen ion concentration (in moles per liter). Lemon juice has a hydrogen ion concentration of $10^{-2.3}$ moles per liter. What is its pH value? 2.3

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◯ = WORKED-OUT SOLUTIONS on p. WS1

★ = STANDARDIZED TEST PRACTICE

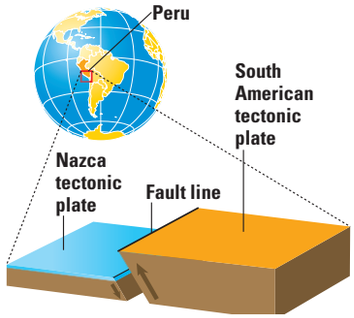
45–53. See Additional Answers beginning on p. AA1.

60. MULTI-STEP PROBLEM Biologists have found that an alligator's length ℓ (in inches) and weight w (in pounds) are related by the function $\ell = 27.1 \ln w - 32.8$. Graph the function. Use your graph to estimate the weight of an alligator that is 10 feet long. **See margin for art; about 281 lb.**

B **61. ★ SHORT RESPONSE** The energy magnitude M of an earthquake can be modeled by

$$M = 0.29(\ln E) - 9.9$$

where E is the amount of energy released (in ergs).



a. In 2001, a powerful earthquake in Peru, caused by the slippage of two tectonic plates along a fault, released 2.5×10^{24} ergs. What was the energy magnitude of the earthquake? **about 8.4**

b. Find the inverse of the given function. *Describe* what it represents.

61b. $E = e^{(M - 1.17)/0.291}$; the inverse represents the amount of energy released, in ergs, as a function of the moment magnitude.

62. ★ EXTENDED RESPONSE A study in Florida found that the number of fish species s in a pool or lake can be modeled by the function

$$s = 30.6 - 20.5(\log A) + 3.8(\log A)^2$$

where A is the area (in square meters) of the pool or lake.

a. Graph Use a graphing calculator to graph the function on the domain $200 \le A \le 35{,}000$. **See margin.**

b. Estimate Use your graph to estimate the number of fish species in a lake with an area of 30,000 square meters. **about 15 species**

c. Estimate Use your graph to estimate the area of a lake that contains 6 species of fish. **about 4000 m²**

d. Reasoning *Describe* what happens to the number of fish species as the area of a pool or lake increases. *Explain* why your answer makes sense.

62d. The number of fish species increases; the larger the area in a pool or lake, the more room there is for more varieties of fish to thrive.

C **63. CHALLENGE** The function $s = 0.159 + 0.118(\log d)$ gives the slope s of a beach in terms of the average diameter d (in millimeters) of sand particles on the beach. Find the inverse of this function. Then use the inverse to estimate the average diameter of the sand particles on a beach with a slope of 0.2. **$d = 10^{(s - 0.159)/0.118}$; about 2.23 mm**

MIXED REVIEW

PREVIEW Prepare for Lesson 7.5 in Exs. 64–71.

Evaluate the expression. *(p. 330)*

64. $2^3 \cdot 2^5$ **256**

65. $(5^{-3})^2$ $\frac{1}{15{,}625}$

66. $8^1 \cdot 8^3 \cdot 8^{-5}$ $\frac{1}{8}$

67. $\left(\frac{5}{3}\right)^{-3}$ $\frac{27}{125}$

68. $\frac{10^6}{10^4}$ **100**

69. $(6^{-2})^{-1}$ **36**

70. $\frac{4^2}{4^5}$ $\frac{1}{64}$

71. $\left(\frac{7^8}{7^9}\right)^{-2}$ **49**

Simplify the expression. Assume all variables are positive. *(p. 420)*

72. $x^{1/2} \cdot x^{2/3}$ $x^{7/6}$

73. $(m^9)^{-1/6}$ $m^{-3/2}$

74. $\sqrt[3]{54x^6y^3}$ $3x^2y\sqrt[3]{2}$

75. $(n^{4/3} \cdot n^{2/5})^{1/6}$ $n^{13/45}$

76. $\frac{x^{1/4}y^3}{x^{5/2}y^{1/2}}$ $\frac{y^{5/2}}{x^{9/4}}$

77. $\sqrt[4]{\frac{x^{16}}{y^{12}}}$ $\frac{x^4}{y^3}$

78. $(\sqrt[5]{x^{10}} \cdot \sqrt[3]{x^9})^2$ x^{10}

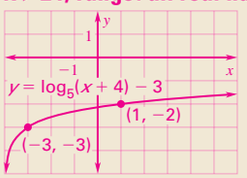
79. $\frac{5\sqrt{x} \cdot \sqrt{x^7}}{\sqrt[3]{250x^{16}}}$ $\frac{\sqrt[3]{4x^2}}{2x^2}$

5 ASSESS AND RETEACH

Daily Homework Quiz

Transparency Available

1. Rewrite the equation $\log_7 343 = 3$ in exponential form. $7^3 = 343$
2. Evaluate $\log_2 \frac{1}{64}$. -6
3. Find the inverse of the function $y = \log(x - 2)$. $y = 10^x + 2$
4. Graph $y = \log_5(x + 4) - 3$. State the domain and range. **domain: $x > 24$; range: all real numbers**



Online Quiz

Available at **classzone.com**

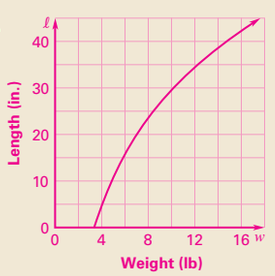
Diagnosis/Remediation

- Practice A, B, C in Chapter 7 Resource Book, pp. 42–44
- Study Guide in Chapter 7 Resource Book, pp. 45–46
- Practice Workbook, pp. 114–115
- @HomeTutor

Challenge

Additional challenge is available in the Chapter 7 Resource Book, p. 50.

60.



62a.